Geothermal Energy

The United States has long been the world's leading geothermal industry. Most U.S. firms, however, have looked abroad for export opportunities only occasionally. In 2014 this changed, as domestic policy uncertainty slowed growth at home and new developments overseas shifted attention to lucrative export opportunities. While ITA expects other renewable energy sectors to deploy more technology over both the short-and-medium term, the industry's considerable market share, should position geothermal exporters for success in international markets.

Evidence of a potential geothermal resurgence began to emerge in 2014. The market is defined by large potential markets that are home to significant untapped resource potential. As these markets grow, the geothermal industry's ability to produce baseload electricity should become increasingly attractive.

U.S. Geothermal Industry Export Base

The United States enjoys a strong and stable geothermal supply chain, with expertise in project development, engineering, geothermal resource assessment, and component part manufacturing. U.S. companies are particularly adept at drilling geothermal wells, as several firms active in oil and gas exploration often crossover to support geothermal development.

ITA expects the United States to capture over one-third of all non-U.S. imports – a far greater market share than any other renewable energy sector. In fact, demand for U.S.-made products and services should increase through both the short and medium-term.

Overview of Global Export Market Opportunities

For the first time, growth in the geothermal market outside the United States is set to eclipse U.S. growth. Indonesia, for example, has 3 GW of projects in its pipeline and Kenya, which again ranks #1 on ITA's list of top geothermal export markets, has a national target of 1.8 GW of new geothermal development by 2016.[69] Geothermal energy offers these countries a primary source of electricity that is key to both economic growth goals and low-carbon development strategies.

The sector's near-term development should support $3.4 billion worth of geothermal equipment imports outside the United States. Since geothermal-related services account for a large share of a project's overall cost, the total number of imports in the sector will likely be far higher. And because U.S. companies enjoy a strong market share – more than 38 percent, according to ITA's projections – this development should strongly support U.S. exports.

Importantly, unlike other renewable energy sectors where project development is both quicker and more consistent, many announced geothermal projects never reach completion. Instead, projects are often abandoned out of resource concerns, a lack of policy support, or development opportunities that occur elsewhere. *Bloomberg New Energy Finance* notes that less than half of the geothermal capacity planned to be online between 2015 and 2017 will likely never be fully commissioned.[70] As such, export projections in the sector are notoriously unreliable.

Figure 1: Near-Term Geothermal Export Markets (2015-2016)

1. **Kenya**
   (large market; large share)
2. **Indonesia**
   (large market; large share)
3. **New Zealand**
   (small market; small share)
4. **Turkey**
   (small market; small share)
5. **Mexico**
   (small market; large share)
6. **Chile**
   (small market; large share)
7. **Peru**
   (small market; small share)
8. **Philippines**
   (small market; small share)
9. **Nicaragua**
   (small market; large share)
10. **Japan**
    (large market; small share)

The Geothermal Export Opportunity in the Near-Term

The geothermal industry is reliant on the availability of naturally occurring geothermal reservoirs and has thus has been limited to markets near tectonic fault lines. As a result, the industry's export markets are extremely concentrated, with only the top 10 markets expected to account for 96 percent of all exports in the sector.

Kenya tops ITA's list of projected export markets through 2016, keeping its rank in last year's report. Should Kenya even approach its national target of 1.8 GW of installed geothermal capacity by 2016, it will be the most important export market in the history of the geothermal sector. Fortunately, U.S. exporters have demonstrated a strong ability to compete in the market and would benefit greatly from this development.

Two factors complicate efforts to support exports in the sector. First, while the United States enjoys a large share of the global import market, development of geothermal projects will account for less than 1 percent of total renewable energy capacity growth through 2016 – and even smaller amount through the medium-term, as other sectors attract far more investment.

Second, the only segment of the geothermal industry not dominated by U.S. suppliers is also its fastest growing – "flash" geothermal turbines. Japanese firms (Toshiba, Mitsubishi, and Fuji) have captured roughly two-thirds of the "flash" turbine market. [71] While the choice of turbine is heavily dependent on the geothermal resource being tapped, flash turbines are expected to capture a large share of new geothermal development. Most projects currently under development are greenfield projects at a site that is yet to confirm the expected resource via full diameter deep drilling (the industry standard), but drilling has commenced at those sites that are expected to be "high-grade flash" resources. This may limit the export opportunity for U.S. component providers going forward.

U.S. companies excel in producing "binary" geothermal turbines and to the extent that markets can be encouraged to build "binary" power plants, the more likely U.S. exporters will benefit from that investment.

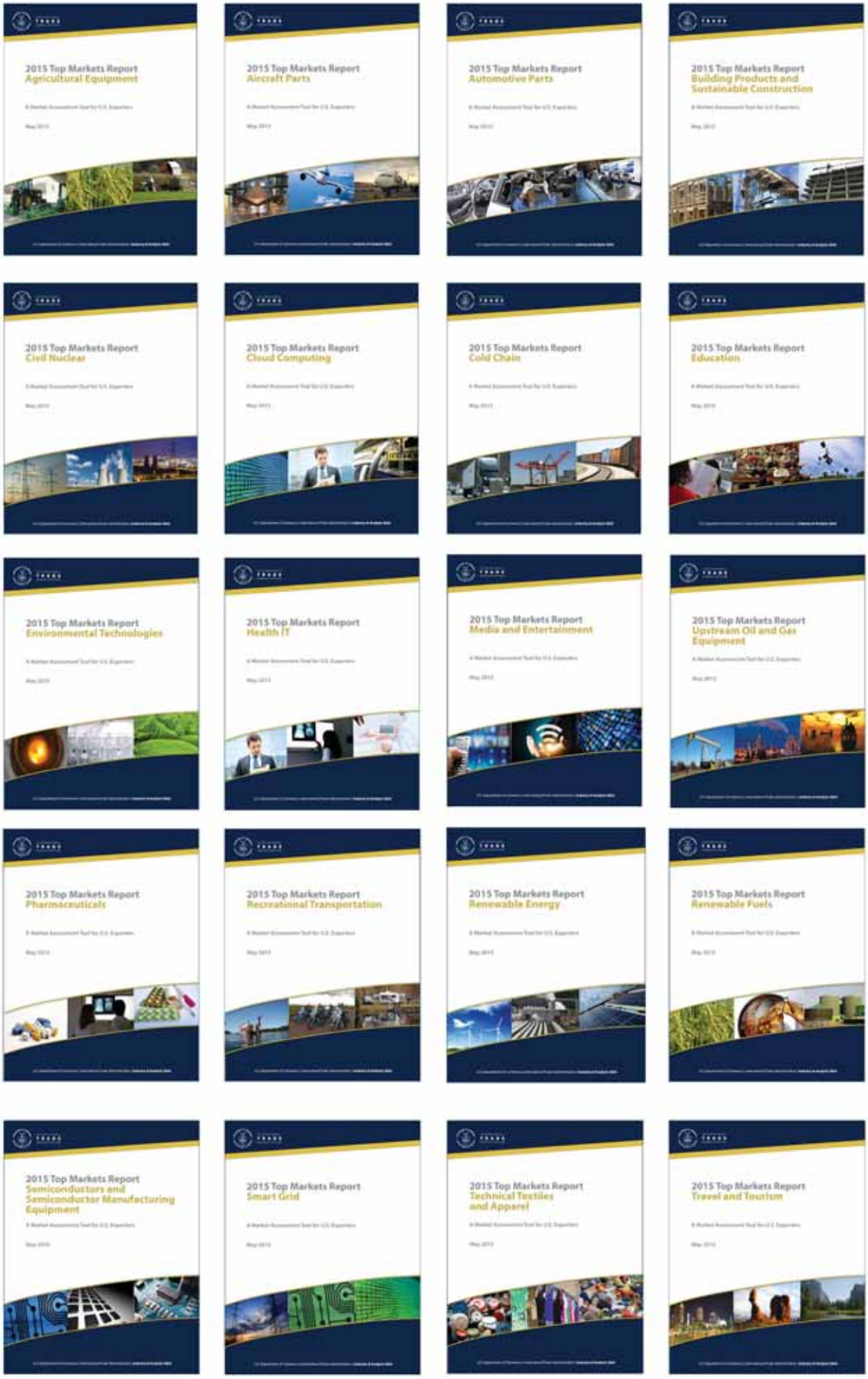
U.S. drilling companies, however, should be able to find success, though the high utilization of oil and gas rigs in the United States will limit the attractiveness of overseas geothermal projects. Falling oil prices, however, may reduce the likelihood that new oil and gas projects are developed, freeing drilling companies to support additional geothermal development around the world.

U.S. exporters may also find short-term export opportunities in the geothermal heat pump industry. While not considered in the *Top Markets* analysis, demand for geothermal heat pumps appears to be increasing globally with U.S. suppliers enjoying considerable market share.

Planning for the Long-Term

Over the next two decades, growth in the geothermal market should accelerate globally, as power demand continues to increase worldwide and the cost of production becomes more attractive. There remains considerable untapped potential in several markets, including Central America, Chile, Japan, Indonesia, and Africa. Investment should flow into these markets hesitantly at first but in larger volumes thereafter.

Latin America offers an important opportunity for the geothermal industry. U.S. export competitiveness increases in the region, where ITA projects over half the import market to be met by products manufactured in the United States. Other competitors, however, also see Latin America as a key future export opportunity. Japan's export bank, for example, has signed agreements with lenders in Costa Rica and Bolivia for future geothermal projects, as has Germany's KfW, which signed an agreement with the Development Bank of Latin America for the same purpose. [72]



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